

Listing of Claims

1. to 11. (CANCELED)

12. (CURRENTLY AMENDED) A set of at least three mouthpieces for a predetermined kind of brass-wind instrument in which individual members of said set thereof have, respectively, contiguously conjoined elements of a rim, a cup-chamber, a backbore-chamber, and an external end-taper, the improvement comprising said individual members each having distinctly non-equal lengths as compared to other said individual members of said set, said individual members each having said external end-taper of a size substantially equal thereto similar to said size of said external end-taper for all other respective members of said set, said set consisting of a minimum of three said respective members, and wherein predetermined said distinctly non-equal lengths have respective and wherein volumetric sizes of said cup-chamber v2 and of said backbore-chamber v3 are determined by:

- a. establishing a predetermined mouthpiece length lengths L3 substantially different than widely accepted music industry standards for brass wind mouthpieces lengths;
- b. encoding into a computer-aided-design software program predetermined external dimensions with dimensions of said rim for said each said mouthpiece,
- c. encoding predetermined constants of a center-bore diameter d1, a largest backbore diameter of a backbore section d2, and total inner chamber volume v1, as substantially fixed design parameters, and
- d. experimentally varying cup-chamber length L1 and backbore length L2 until volumetric chamber sizes of $v2 + v3 = v1$, as calculated by said computer-aided-design software program, where L1 + L2 equals mouthpiece length L3,
- e. repeating steps a. through d. for each of said individual members of said set producing additional mouthpieces by varying rim shapes and cup-chamber diameters while holding constant volumetric size v2,

—whereby reverse engineering methods create inversely proportioned mouthpiece designs using predetermined increments of said lengths that are longer and/or shorter than prior art lengths.

13. to 16 (CANCELLED)

17. (CURRENTLY AMENDED) A set of mouthpieces for a predetermined kind of brass-wind instrument, wherein individual members of said set thereof each include, respectively, contiguously conjoined elements of a rim, a cup-chamber, a backbore-chamber, and an external end-taper, and wherein the combined improvement within said set of mouthpieces comprises a set of at least three of said individual members for said predetermined kind of brass wind instrument each having a different length and a different volumetric cup-chamber connecting to a smaller diameter center-bore, such that a first of said members one said member has a shorter length and a larger volumetric cup-chamber size relative to a second of said members another said member having a longer length and a smaller volumetric cup-chamber size thereby defining a relative relatively inversely-proportioned relationship between said length and cup size chamber for each said member within with said set, and wherein said individual members each having said external end-taper of substantially equal size configured to fit said predetermined kind of brass wind instrument similar size, whereby changes in timbre of sound are strongly achieved through said set as a function of said different mouthpiece lengths and cup-chamber depths for the predetermined kind of brass-wind instrument and provides a visual cue through said different lengths aiding selection of one of said set to meet performance requirements for a particular style of music.

18. (CURRENTLY AMENDED) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has separable sections divided parts selected from a group of rim rims sections parts, cup-chamber sections parts, backbore sections parts, tops section parts and bottom bottoms section parts.

~~said sections parts having fastening means for fastening at least one of each said interchanging similarly fastened sections parts together to provide each said mouthpiece to provide an alternative recitation of the parent claim plus one or more new elements whereby a logical exchange of interchangeable sections help musicians fine tune playing characteristics of a mouthpiece, and whereby said separable sections are connected to separable prior art sections for improved function of such prior art sections.~~

19. (PREVIOUSLY PRESENTED) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has a substantially similar internal volumetric size, wherein internal volumetric size equates substantially to said volumetric cup-chamber size combined with said volumetric backbore-chamber size thereby providing constancy of internal volume and improved intonation qualities of said mouthpieces within said set.
20. (PREVIOUSLY PRESENTED) The set of mouthpieces for a predetermined kind of brass-wind instrument of Claim 17, wherein each mouthpiece has a substantially similar fundamental frequency of resonance when each mouthpiece body is closed shut where said cup-chamber adjoins said rim, thereby providing improved intonation qualities of each mouthpiece within said set.
21. (CANCELLED).
22. (PREVIOUSLY PRESENTED) A method of approximating overall length of a mouthpiece for a predetermined kind of brass-wind instrument which includes the steps of:
 - a. measuring total inner chamber volume (v_1) for a given working mouthpiece for said predetermined kind of brass-wind instrument,
 - b. measuring a smallest diameter at a center-bore region (d_1) of said given working mouthpiece,

- c. measuring a largest diameter of a backbore region (d2) of said given working mouthpiece,
- d. forming a first rim and a first adjoining cup-chamber of one of a larger and smaller size than inner cup-chamber volume of said given working mouthpiece,
- e. determining an axial length (L1) of said first adjoining cup-chamber,
- f. measuring inner volume of said first adjoining cup-chamber (v2),
- g. calculating inner volume of a first chamber bore-volume (v3) by subtracting said inner volume v2 from said total inner chamber volume v1,
- h. calculating a first backbore-chamber length (L2) according to the following equation:

$$L2 = \frac{3(v3)}{3.1416(R^2 + rR + r^2)} \quad \text{where } r = \frac{1}{2} d1 \\ R = \frac{1}{2} d2 ,$$

- i. calculating total axial length (L3) for a new mouthpiece body by adding L1 with L2.

23. (CURRENTLY AMENDED) A method of forming a set of mouthpieces for a predetermined kind of brass-wind instrument, which includes the steps of:

- a. measuring total inner chamber volume (v1) for a given working mouthpiece for said predetermined kind of brass-wind instrument,
- b. measuring a center-bore diameter (d1) of said given working mouthpiece,
- c. measuring a largest diameter of a backbore region (d2) of said given working mouthpiece,
- d. forming a first rim and a first adjoining cup-chamber of one of a larger and a smaller size than a cup-chamber volume of said given working mouthpiece,
- e. determining an axial length (L1) of said first adjoining cup-chamber,
- f. measuring inner volume (v2) of said first adjoining cup-chamber (v2),
- g. calculating inner volume of a first chamber bore-volume (v3) by subtracting said volume v2 from said total inner chamber volume v1,

h. calculating an axial length of a first backbore-chamber length (L2) according to the following equation:

$$L2 = \frac{3(v3)}{3.1416(R^2 + rR + r^2)} \quad \text{where } r = \frac{1}{2} d1 \\ R = \frac{1}{2} d2 ,$$

i. calculating total axial length (L3) for a new mouthpiece body by adding L1 with L2,

j. forming a backbore chamber of length L2 onto said first adjoining cup-chamber opposite to said first rim,

k. creating a ~~frustoeconical shape bore having volume v3~~ in said backbore-chamber having an inner volume v3 where parameters d1, d2, and L2 substantially define said inner volume frustoeconical shape bore and where the ~~small end of said frustoeconical bore shape abuts the small end of said cup-chamber,~~

l. forming ~~a~~ first an external end-taper onto an outer surface of said backbore chamber substantially equal similar to an external end-taper region on said given working mouthpiece, and

m. wherein said set is made by substituting an alternative volume for v2 of said first adjoining cup-chamber volume v2 and repeating steps d through l.

24. (CANCELLED).

25. (CANCELLED).